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PATENT



SPECIFICATION

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# COMPLETE SPECIFICATION.

## Improvements in the Production of Picture Effects.

We, CHARLES WILLIAM REA CAMPBELL, Engineer, of Driehoek, Germiston, Transvaal, Union of South Africa, and FRANK GOWYNE ALFRED ROBERTS, Engineer, of corner of Victoria and St. Patrick's Avenues, Parktown, Johannesburg, Transvaal, aforesaid, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to the production of picture effects suitable for advertising or amusement purposes by apparatus embodying a series of actual pictures and such that upon relative movement between it and an observer a  
10 virtual picture is produced having the characteristics that it can be made to be stationary relatively to the observer and can exhibit motion effects. The term picture is used to denote any desired representation including words, designs, scenes and the like.

A known form of advertising device comprises a series of illustrated panels  
15 or pictures placed side by side in the same plane on a suitable support, and a plate or wall located in front of said panels and parallel thereto, said wall being furnished with vertically disposed slots or apertures placed centrally with the  
panel immediately behind so that only one panel or picture may be viewed at  
one time by an observer in a train travelling rapidly past the apparatus along  
20 an adjacent track. Such an observer sees an apparently animated picture owing to the successive and separate presentation of the actual pictures.

A purpose of the present invention is to enable the virtual picture to be seen more readily and perfectly, and with a lower rate of relative movement than is the case where the virtual picture is produced kinematographically, i.e., by the  
25 successive and separate presentation of each actual picture. Another purpose is to produce an indefinite series of virtual pictures; and a further purpose is to produce the desired result by apparatus having no moving parts and of cheap and simple construction suitable for erection at the side of a road or railway similarly to a bill hoarding.

30 In the accompanying drawings, Fig. I is a perspective view of an apparatus embodying the invention and erected by the side of a road.

Figs. II to VI are diagrams illustrating the principle of the invention.

Figs. VII to XI illustrate special features of the invention.

Referring to Fig. I, 1 indicates a background which is as a whole plane  
35 and which extends without interruption for the entire length of the apparatus. To said background is applied a number of actual pictures 2 which are substantially similar; that is they may be identical or differ progressively in detail.

3 is a continuous screen which is plane as a whole. It is fixed relatively to

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and in front of the background 1; and is parallel to a material extent parallel therewith. It is formed with a series of slots 4 extending to a material extent (and as shown actually) transversely to the direction in which the relative motion occurs; that is, in the present case extending vertically since the apparatus is arranged to be seen by an observer travelling along the road 5, for instance in a street car 6.

The slots 4 are usually spaced uniformly from one another. The actual pictures 2 are placed behind their respective slots and are of the same width (in the direction of motion) as the distance between the centres of the slots. They may be narrower than said distance but in that case the spaces between them would be included in the observed or virtual picture and mar the same if large and inharmonious therewith. In fact the actual picture is all that which appears on the background 1 between points of the background which are midway between successive slots of the screen.

Fig. II is a diagrammatic plan of the device and Fig. III an elevation of the background. Referring to these figures assume an observer at A and there to be relative movement between him and the apparatus as indicated by the arrow. Considering for the moment only the effect of a single slot 4, the observer's field of vision through the slot at the instant when he is at the relative position A, comprises the section  $s$  of the actual picture 2. When he reaches the position  $A^1$  his field of view comprises the section  $s^1$ ; at  $A^2$ ,  $s^2$  and so on until, when he reaches  $A^n$ , his field of vision has swept over the whole original picture 2. Assuming a proper speed of movement, the entire picture is thus impressed as a whole on his retina. There is of course actually no successive presentation of separate picture sections  $s$ ,  $s^1$  etc., but a continuous presentation in a given field of vision, (*viz.* the slot 4,) of a continuously and progressively varying picture section. The observed or virtual picture is however stationary relatively to the observer since each section or separate feature of the actual picture is seen momentarily in a given position relative to the observer and is not seen again in a different position relative to the observer which would of course give the impression of motion.

Only one slot 4 has so far been considered; but (referring to Figs. IV and V which are similar to Figs. II and III respectively) at the same time that section  $s$  of the picture 2 is being observed through slot 4 from point A, a somewhat further advanced section  $s^1$  of picture 2<sup>a</sup> is being observed through slot 4<sup>a</sup>; and similarly sections  $s^2$ ,  $s^3$ , etc., are being observed through slots 4<sup>b</sup>, 4<sup>c</sup>, etc. Thus at a given instant several sections of the field of view are presenting a sequence of related picture sections which blend; and in addition each of said view sections is itself being swept over its actual picture further to form a composite observed picture, as first described, (*vide* lines of vision emanating from point A<sup>1</sup> Fig. IV). The virtual picture is thus constituted both by the simultaneous presentation at any instant of different sections of different but substantially similar actual pictures and by the progressive presentation within a short interval of time of the whole of each actual picture. Considered during a short interval of time these two phenomena become practically identical, since a single slot 4, Fig. II, within a short interval of time occupies all the positions of the different slots 4, 4<sup>a</sup> etc. of Fig. IV.

Whilst only one virtual picture has been referred to, there is in fact an indefinite number observable, limited only by the length of the apparatus, the cutting off of distant pictures by the thickness of the slots and the possibilities of viewing distant objects. Referring to Fig. VI the observer at A can see one virtual picture 7 through the slots lying between B and C, another 7<sup>a</sup> through the slots between C and D, another 7<sup>b</sup> through slots between D and E and so on indefinitely.

Since, relatively to the observer at A, the virtual picture begins at E and ends at F Figs. IV and V its length is the distance between E and F or, what is the same thing, the distances A—A<sup>6</sup> plus  $s—s^6$ , Fig. II; that is to say it is, as

compared with the actual pictures elongated in the direction of motion, whilst its dimensions transverse to the direction of motion are unaltered. In order to produce a reasonably normal virtual picture, the actual pictures are fore-shortened in the direction of movement. In Fig. VII. 8 indicates a series of 5 actual pictures designed to produce a normal virtual picture 9.

The correction produced in this way is mathematically true for only one distance of the observer from the apparatus. The further the observer is away, the larger is the virtual picture. Referring to Fig. IV, an observer at A sees the virtual picture P-E-F<sup>1</sup> whilst an observer at A' sees the virtual 10 picture E'-F'. If  $p$  be the width of the actual picture,  $P$  the width of the virtual picture,  $D$  the distance of the observer from the background 1, and  $d$  the distance between the background 1 and the screen 3, then  $\frac{P}{p} = \frac{D}{d}$ . This formula gives the necessary foreshortening of the actual pictures for a given apparatus and is also a useful guide for the dimensions of an apparatus for a 15 given situation.

It also shows that if  $D$  be large its variation due to such different positions of the observer as might generally occur in practice does not materially distort the virtual picture. For instance in the case of a hoarding apparatus standing at an appropriate distance from a roadway, the observing point of view may 20 be varied by the width of the roadway without giving rise to exaggerated results; since many designs of a nature suitable for advertising do not appear exaggerated until very considerably distorted.

It will be noticed that the apparent size of the virtual picture is constant for all the virtual pictures seen at one time; in other words they appear as equal 25 sized objects at their true distances from the observer, and the one correction for distortion is true for all of them.

In stating above that the virtual picture remained stationary, the effect due to the width of the slot was disregarded. Since the slot has some width, a point  $q$  of an actual picture (Fig. II) is seen both from A<sup>3</sup> and A' and at 30 intermediate points. Consequently each element of the virtual picture moves relatively to the observer a distance slightly greater than the width of the slot; and vertical elements of the picture are correspondingly blurred. This effect is kept within unobjectionable limits by using bold lines and by suitably restricting the width of the slots. In practice however the slots may be made 35 amply wide enough to give, in daylight, sufficient illumination to enable the virtual picture to be easily seen; especially in view of the fact that the virtual picture is the component of those furnished by several slots simultaneously.

Suitable dimensions for a hoarding device are:—

Distance of background from observation point -	-	-	40 feet
40 Distance between background and screen -	-	-	5 feet
Height of slots and of actual pictures -	-	-	10 feet
Width of actual pictures and distance between slots -	-	-	15 inches
Width of slots -	-	-	2 inches

The minimum rate of movement necessary to produce the desired effect is very 45 low since the whole virtual picture is presented during movement equal to the distance apart of the slots; that is the distance A A' Fig. IV. This, as indicated above, would usually be small enough to cause it to be traversed several times in a second at a walking rate.

When motion effects are desired, they may be produced in the well known 50 manner by means of progressive changes in the actual pictures. As the virtual pictures extend indefinitely the motion effect may be continuous throughout them. For example a succession of figures may be shown throwing a ball to on another.

Effects of motion may also be produced by modification of the apparatus.



By inclining the slots the virtual picture is distorted obliquely and oppositely to the inclination of the slots. Thus for example by progressively inclining the slots 4 in alternate directions, as indicated in Fig. VIII, the effect of a swinging pendulum may be produced from a series of identical actual pictures 10. The slots may be inclined at part only of their length, and differently inclined 5 in different parts. By using serpentine slots 4 Fig. IX, which differ progressively, a wave effect up or down the virtual picture is produced. Special slots for such purpose may be formed in screen panels 11 removably held in a screen frame 12 so that they may be changed from time to time according to the effect desired.

Also by varying the distance between the background 1 and the screen 3, the virtual picture may be caused to expand or contract in width. Fig. X shows in plan a screen 3 which first diverges from and then approaches the background 1 and so causes the virtual picture first to decrease in width and then to increase. Fig. XI is another plan shewing a sinuous background 1 which produces a similar effect.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. The method of producing virtual pictures by exhibiting successive sections 20 of a number of similar actual pictures simultaneously and successive sections of each actual picture in sequence within a short interval of time.
2. The method of producing virtual pictures by presenting in several sections of the field of view successive sections of a number of similar actual pictures, which view sections are swept completely over the actual pictures.
3. Picture exhibiting apparatus comprising a continuous background carrying a series of actual pictures and a continuous screen fixed relatively to and in front of said background and formed with numerous narrow slots arranged to a material extent transversely to the length of said background and screen so as to present harmonising sections of a number of the actual pictures simultaneously, said apparatus being arranged so that an observer can see sections 25 of several actual pictures through several slots at once, said sections together forming a virtual picture.
4. Picture exhibiting apparatus comprising a fixed background carrying a series of actual pictures and a fixed screen in front of said background and formed with numerous slots, said parts being arranged parallel with a roadway, 30 their distance and the spacing of the slots being such that an observer on said roadway can see at one time through a number of the slots.
5. Apparatus as claimed in Claims 2 or 3 in which effects of motion are produced by varying at different points in the length of the apparatus, the disposition of the elements of the apparatus relatively to one another.
6. The method of and means for producing virtual pictures substantially as described with reference to the accompanying drawings.

Dated the 8th day of June, 1916.

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London,  
For the Applicants.

Fig I

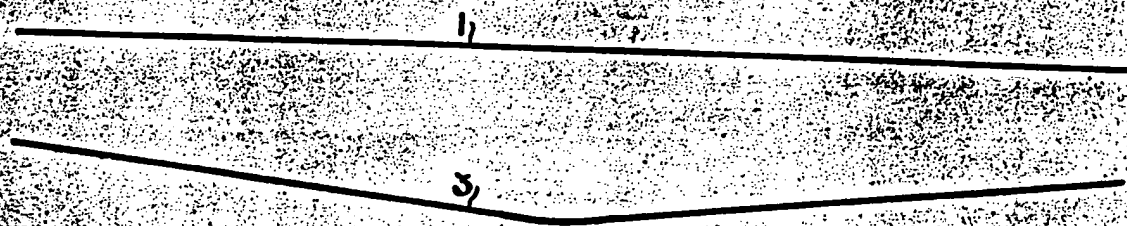
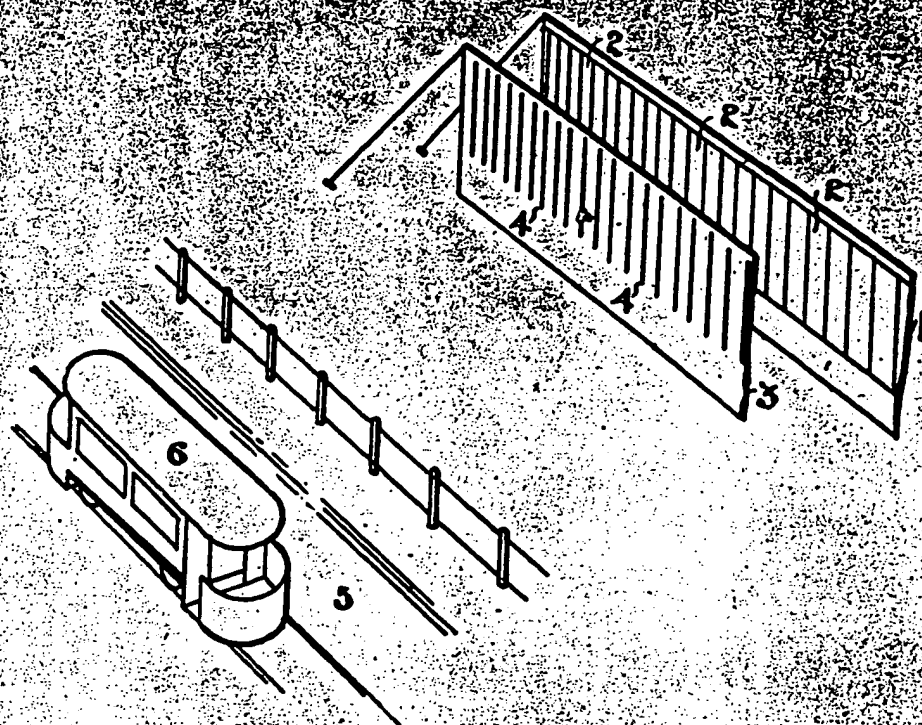


Fig. I

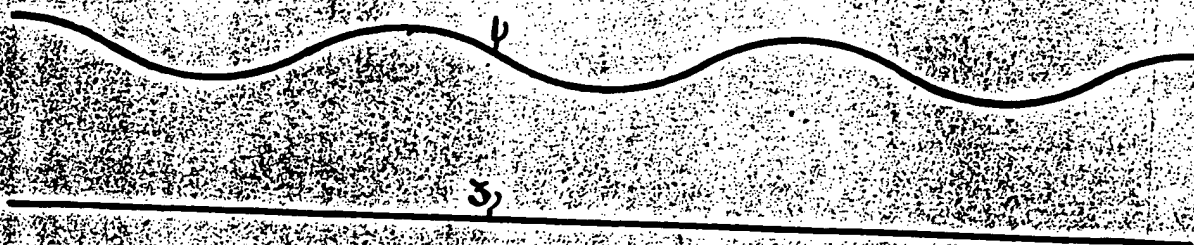


Fig II

[This Drawing is a reproduction of the Original on a reduced scale.]

SHEET 1

(4 SHEETS)

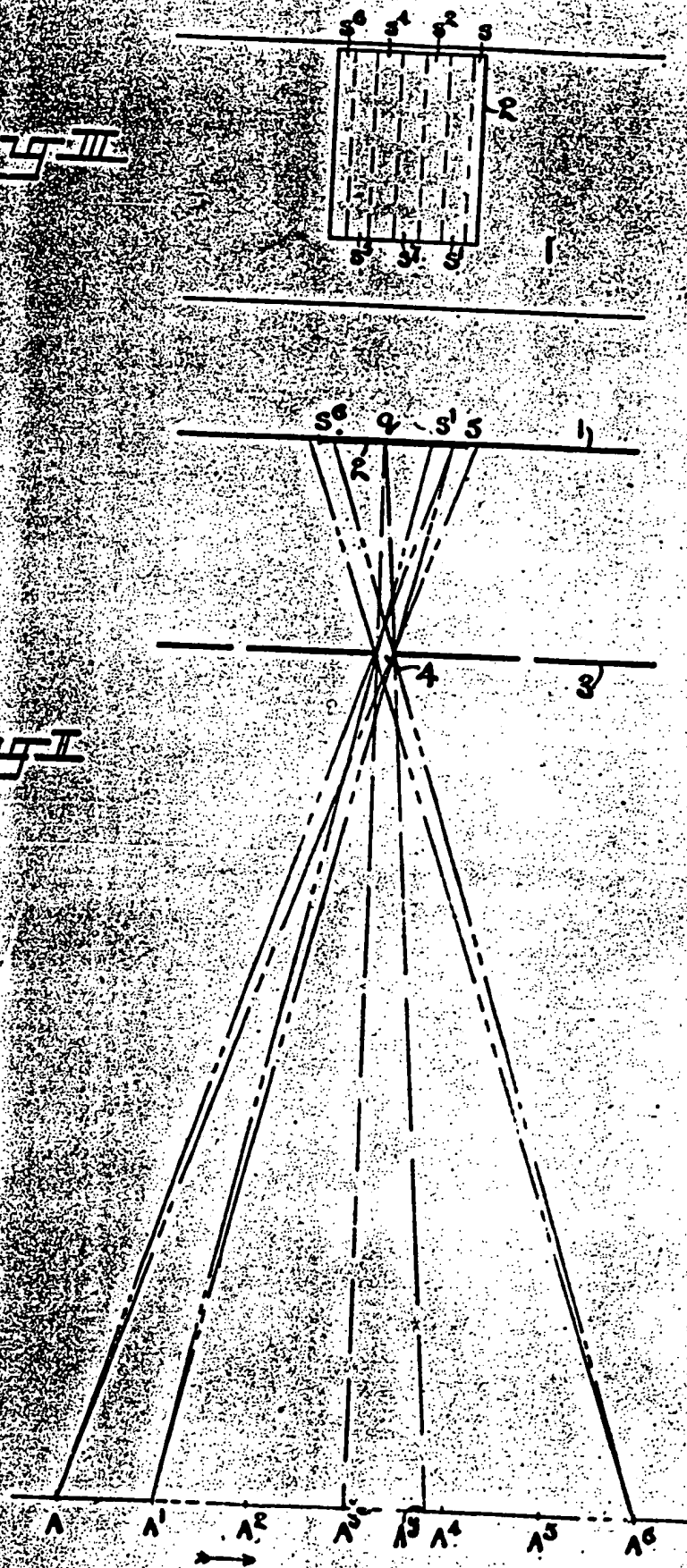
SHEET 2

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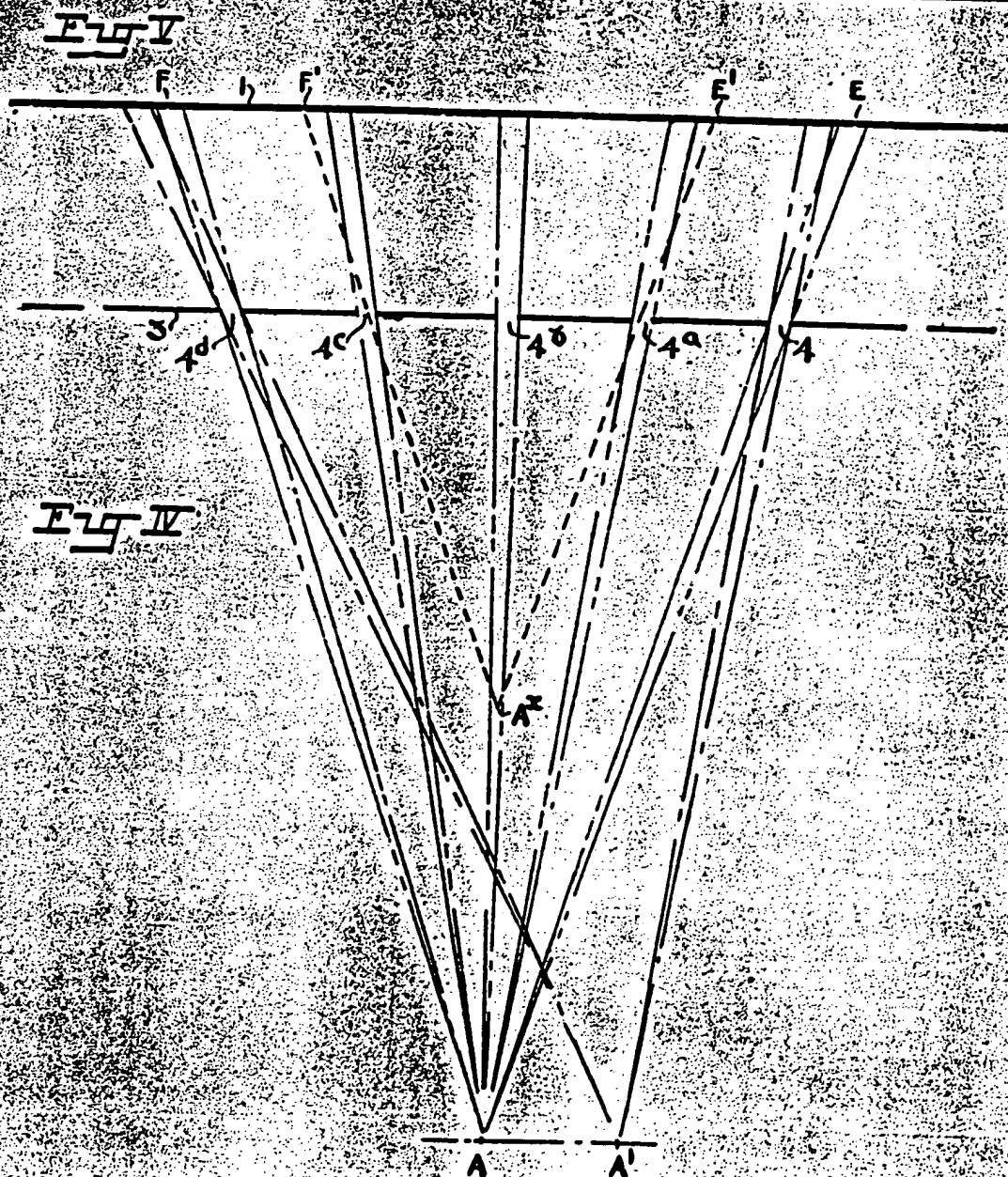
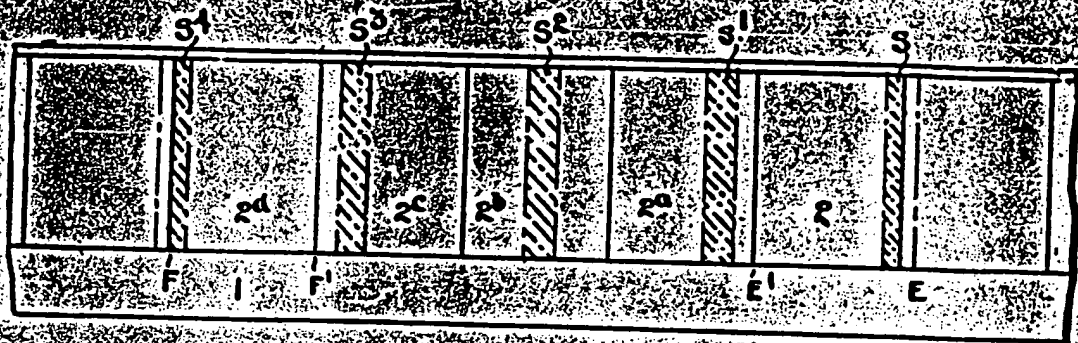
SHEET 4

Fig. III

Fig. I







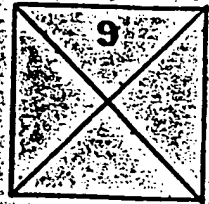
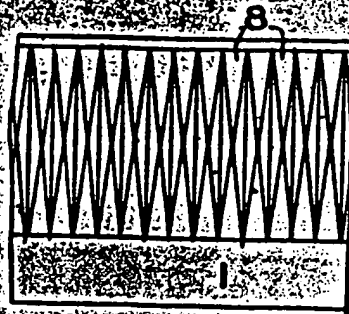
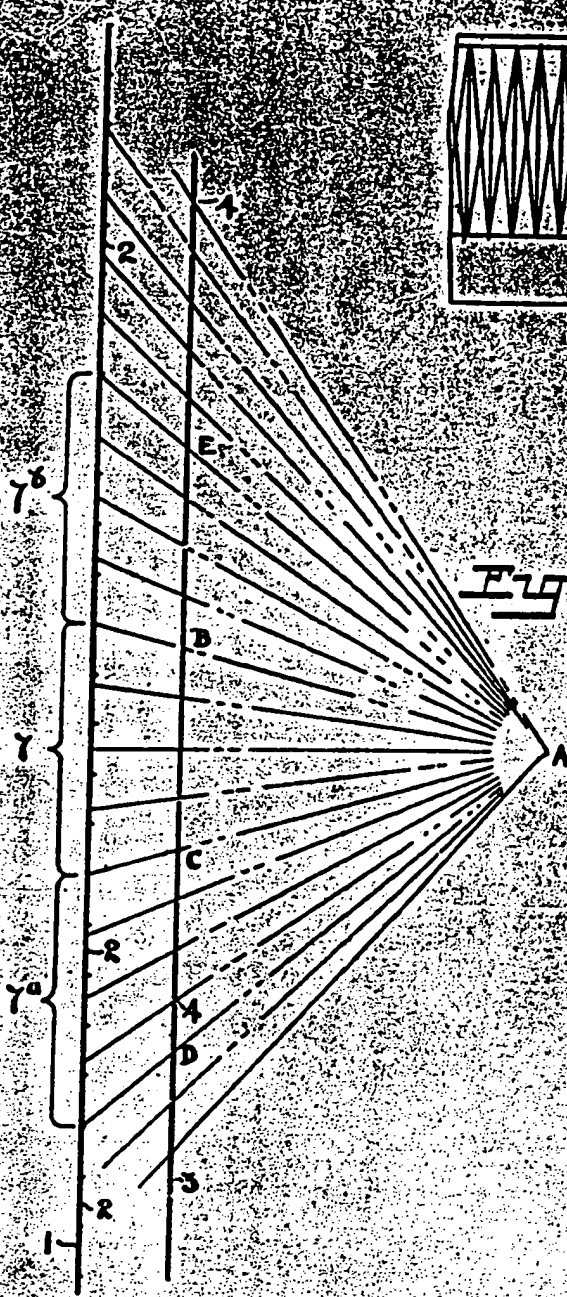


Fig VII

Fig VI

Fig II

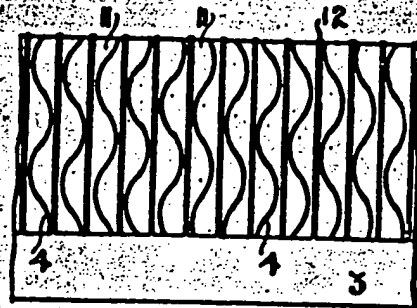


Fig VIII

